



"Thingy"
The NAIF ~~Node~~
[#SPICE Boys]

Some questions are shown in red font

**PDSMC Meeting
Tucson, AZ
10-11 April, 2014**

"Active" Mission Archive Status

Mission	Archive End Date	Archive Size (GB)	Comments	Status
Cassini	2013-03-31	44.9		
DAWN	2012-09-13	13.5		
DI / EPOXI	2011-03-01	0.7 / 1.0	Had hoped to get a final end-of-mission run-out trajectory from NAV, but now see this won't happen.	
GRAIL	2012-12-17	2.8	Awaiting last bit of precision orbit data from the gravity investigation.	
LADEE	not yet started	0	Archival data provided by the project: NAIF to produce the PDS4 compliant archive	
LRO	2013-12-15	148.8	Archive increments produced by GSFC	
MAVEN	not yet started	0	NAIF will make ops kernels and produce the archive in PDS4 style	
MER 1	2013-09-07	3.4		
MESSENGER	2013-09-17	22.2	Archive increments produced by APL	
MEX	2013-04-30	2.1	Archive increments produced by ESA	
Odyssey	2013-06-30	16.7		
MRO	2014-01-01	134.5		
MSL	2013-08-10	0.2		
New Horizons	2007-09-07	1.0	Archive increments produced by APL	
Rosetta	2011-12-31	0.3	Archive increments produced by ESA	
VEX	2012-11-30	0.6	Archive increments produced by ESA	

Restoration Archive Status

Mission	Comments
Magellan	Have all the data we'll ever get. Almost completed. Need some free time to finish it.
Galileo	Many challenges, especially with regard to s/c attitude (CK). Made some real progress last Fall, but quite a bit more work remains. Need free time.
Phoenix	Have all needed data. Need free time to produce the archive.
LCROSS	Have gotten all the data we'll ever get. Need to cobble together some sort of clock correlation data to make an SCLK. Need free time to produce the archive.
Voyager	No work on this for quite some time other than receiving improved Jupiter and Saturn fly-by trajectory data.

Upcoming Missions Using SPICE

- SPICE production and archive provided by NAIF:
 - Soil Moisture Active and Passive (earth science; no PDS archive)
 - Osiris REx
 - InSight
 - Other possibilities
 - Europa Clipper (mission design folks are already making some use)
 - Mars 2020 (mission design folks are already making some use)
 - Next Discovery selection?
- SPICE production and archive provided by others:
 - Solar Probe Plus (APL, space physics)
 - Solar Orbiter (ESA, space physics)
 - Akatsuki, Hayabusa - 2 (JAXA)
 - Other possibilities?
 - ExoMars 2016, BeppiColumbo and JUICE (ESA)
 - Venera-D, ExoMars 2018, Luna Glob (RSA)
 - Future planetary missions (JAXA)

Migration to PDS4

- NAIF will produce the LADEE, MAVEN and ORX SPICE archives using PDS4 standards.
 - Will require some PDS4/XML education for Boris, with some help from EN
- Whether or not to eventually migrate any of the already completed archives to PDS4 remains TBD.
- This TBD also applies to the ongoing missions with “accumulating” archives, once they are completed.
 - Would such a migration provide a tangible benefit to users of PDS4?

Questions for PDS regarding Non-NASA and Non-SPICE Archives

- Assumption: starting from “now,” any/all foreign mission SPICE or other style ancillary data archives are to be served just from the archive of that agency/country/mission; IPDA interoperability will allow access to those data just as if they were archived at NAIF.
 - Correct?
- Assumption: any NASA planetary mission producing an ancillary data archive in other than SPICE form will archive said data at other than NAIF, using one/some of the other allowed PDS4 data formats. And no reason to try to “convert” these data to SPICE equivalents.
 - Correct?

Deliveries to NSSDC

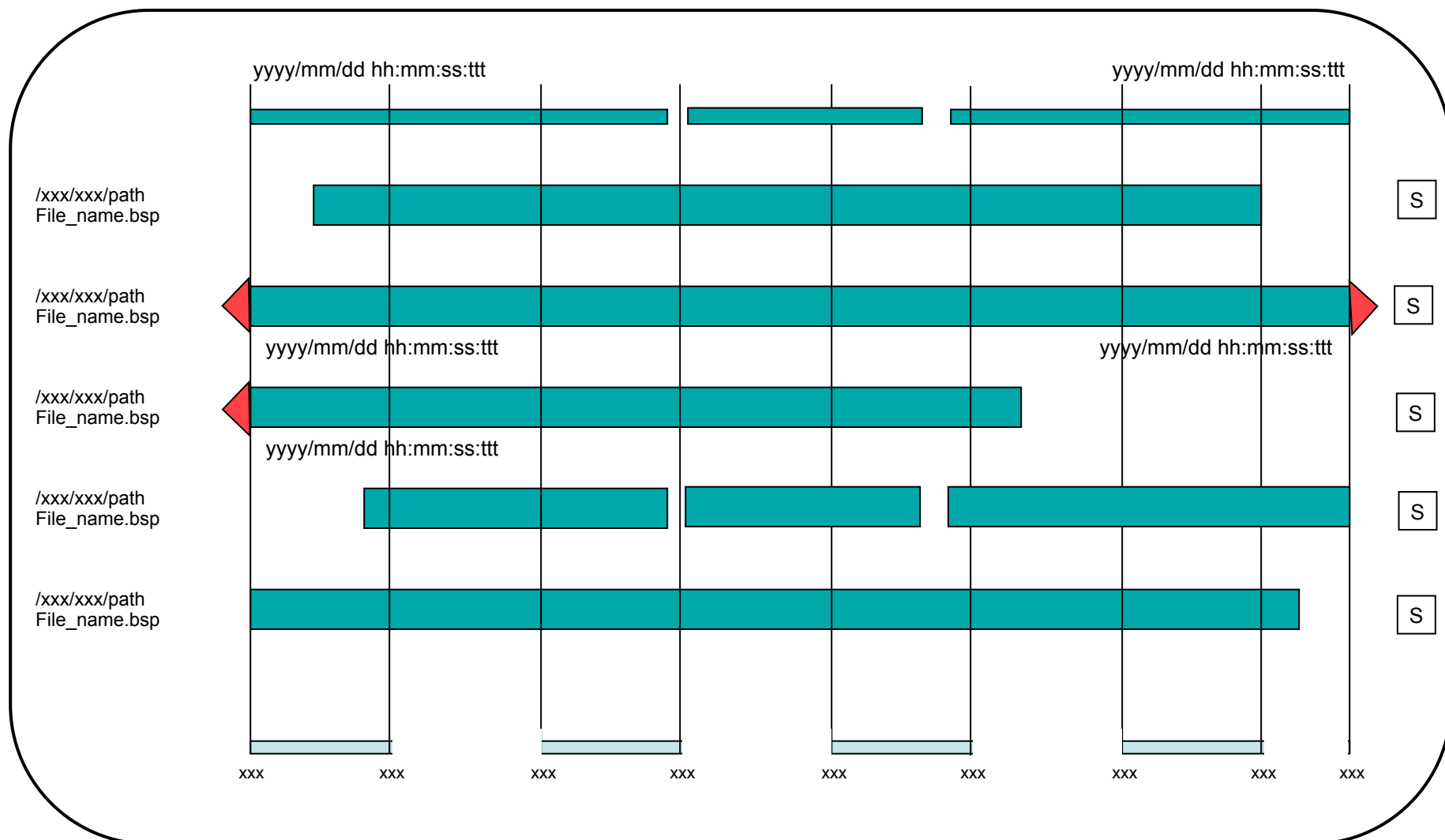
- NAIF delivers to NSSDC once per year
 - Usually in November, using a data brick
- Last delivery was in November 2013
 - 17 data sets, totaling 368 Gbytes
 - Majority are redeliveries of accumulating data sets

Other Topics - 1

- Security
 - GEO Node is the remote backup for NAIF; new data get copied there every night
 - JPL also provides offsite data backup, and the NAIF server uses a RAID L4 disc farm
 - JPL IT security people implement IP blocking as they see fit
- DDWG support from NAIF
 - Essentially none, since SPICE is an accepted format
 - SPICE boys are “observers” to the geometry tiger team
- CCB support from NAIF
 - None
- Top Coder
 - NAIF provided two ideas to Grayzeck/PDS for future consideration
 - Design/build an SPK summary GUI tool
 - Construct means to use Cosmographia, Celestia or a similar mission visualization tool to easily run using any mission’s SPICE archive

SPK Summary Tool - Top-level Display

Multiple SPK Files of "Dissimilar" Time Span

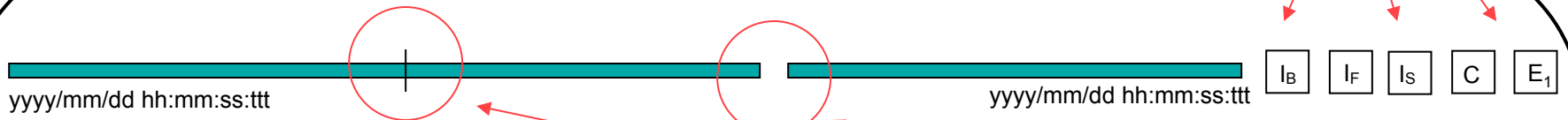


Pressing an S leads to the page for display of a single SPK file. See next chart.

SPK Summary Tool - Top-level Display

Single SPK File

Clicking one of these buttons leads to further information about the SPK. (See subsequent pages.)



File name

Earliest start time: yyyy-mm-ddThh:mm:ss.ttt

Latest stop time: yyyy-mm-ddThh:mm:ss.ttt

Time span: <duration> <units>

Gaps present: nnn (summed across all objects) Largest: xxx Smallest: yyy

IDs of centers of motion: <id>, <id>, etc.

Frame names: <name>, <name>, etc.

SPK Types Present: <type>, <type>, etc.

No. of target objects: nnn

ID of object NAIF name (if it is known)

ID of object NAIF name (if it is known)

ID of object NAIF name (if it is known)

ID of object NAIF name (if it is known)

etc.

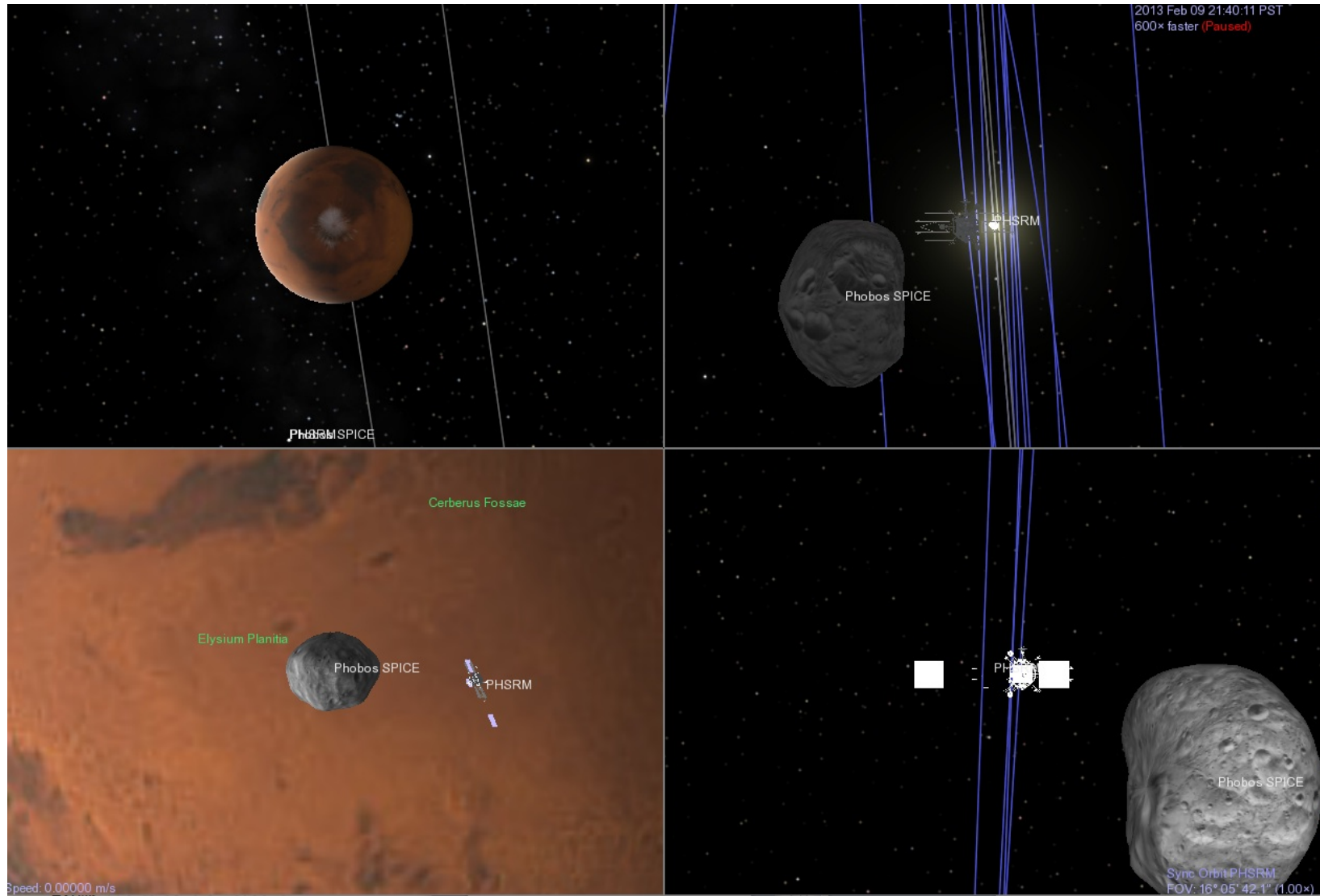
No. of center objects: mmm

ID of object NAIF name (if it is known)

ID of object NAIF name (if it is known)

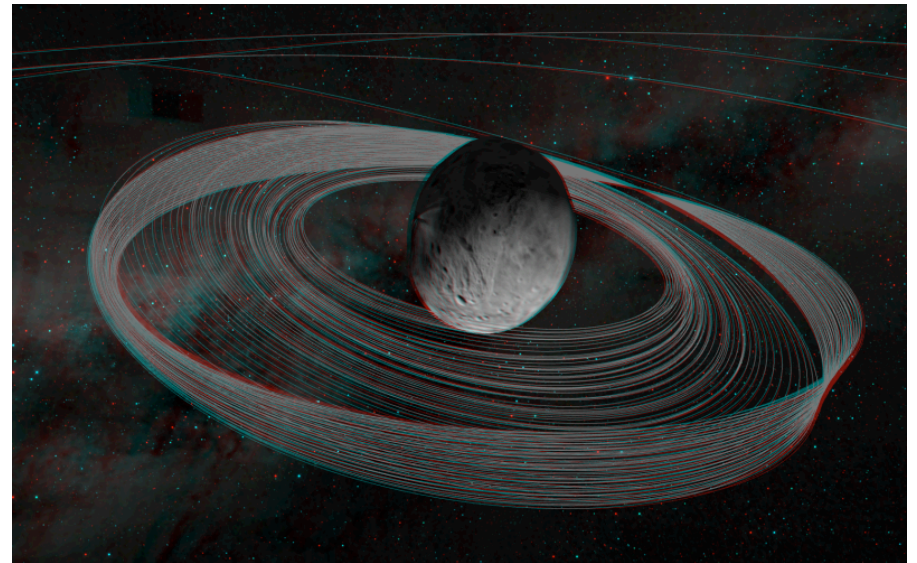
etc.

Mission Visualization Tool Based on Celestia



Phobos Grunt Mission

Mission Visualization Tool Based on Cosmographia



Dawn Mission

Other Topics - 2

- Next SPICE Generic Toolkit – Version N65
 - At least two years behind original plan
 - Will be the largest set of additions ever
 - Will provide significant performance improvement to processes that make substantial use of the frames subsystem
 - Should be released in May
 - JNISpice and the Digital Shape Kernel subsystem will still **not** be a part of the generic Toolkit
 - Updates will be released as separate, updated alpha-test packages
 - Will be folded into a future generic Toolkit release(s)
- A Python interface to SPICE remains on our to-do list
 - Don't know when we'll get back to work on this

Other Topics - 3

- WebGeocalc (<http://wgc.jpl.nasa.gov:8080/webgeocalc>)
 - Has not yet been widely announced
 - Hope to get a few small bugs fixed and a few changes made in the next few months before widely announcing its availability
 - Modest use to date
 - During the period 13 Jan 2014 through 26 March 2014:
 - 236 unique IPs connected
 - 104 of those made one or more computations (yes, some just kicking the tires!)
 - NAIF team has found it very useful
 - Some others have written with the same comment
 - APL appears on the verge of becoming a big user (MESSENGER and SPP)
 - Logs show access from around the globe
 - No signs of significant problems
 - Unfortunately many users seem to not have read the instructions in “About the data” regarding the time spans covered and what kernel sets contain what kinds of data
 - Numerous failures trying to use invalid (unrecognizable) time strings

Other Topics - 4

- SPICE Training
 - NAIF anticipates holding another “beginner’s” class later this CY
 - Probably in October or November
 - Probably done on the East Coast, at or near GSFC or APL
 - NAIF has provided a self training package, consisting of shortened tutorials and the usual programming lessons
 - http://naif.jpl.nasa.gov/naif/self_training.html
- NAIF prepared a list of “SPICE-enabled tools”
 - http://naif.jpl.nasa.gov/naif/SPICE_aware_Tools_List.pdf
 - Maybe some could be of interest to others
 - In any case, helps a bit in illustrating the broad use of SPICE

Other Topics - 5

- In August 2012 NAIF initiated an effort to organize a mostly COSPAR-funded “Capacity Building Workshop” in Eastern Europe, involving some PDS nodes and possibly ESA
 - Kiev, Ukraine was the most likely location
 - Gave up on this in March 2013 when NASA announced travel restrictions. No plans to try again.
- Anticipating a new hire, in October 2014
 - An already trained SPICE guru
 - Will work half-time on core SPICE development
 - Will work half-time on a new NASA task to improve the existing DSN “operating system” and to help modernize all three NASA networks.
 - Will also support the Lunar Mapping & Modeling Program (LMMP)

Outlook for Next Five Years

- Keep on trucking ...
 - NAIF Node work
 - Support new missions as they come along
 - Continue ops support and archiving for on-going missions
 - “Finish” the restoration work
 - Support PDS4 as needed/requested
 - SPICE Development work
 - Long list of core SPICE development work to do
 - Long list of WebGeocalc enhancements to consider
 - One day we’ll have to decide if/how/when to migrate from Fortran 77 to ??? as a new base language
 - NASA networks modernization support
 - Some new and some improved DSN capabilities
 - Some sort of consolidation of the three existing networks ?????
- Do the nodes have any requests of NAIF?

International Cooperation

- If/how/when/where to engage in international co-operation remains difficult to discern
 - Have heard ESA “wants NAIF support” for ExoMars 2016, and likely for BepiColombo and JUICE, but have no details or NASA directives.
 - JAXA said they still want some NAIF support for Akatsuki. (NAIF is a member of the Participating Scientist team.) Awaiting NASA directives.
 - An ISRO person said they want SPICE consultation for some earth science missions... but have heard no further news from them.
 - No news from Russia as to any help wanted for ExoMars 2018, Venera-D, Luna Glob or any others. (Maybe now moot?)
 - Generally difficult to get any substantive input from the foreign partners
 - Maybe we should ask if providing past support has resulted in real value to the U.S. science community? Perhaps the answer is yes and no?
- Questions for NASA PSD:
 - Should NAIF continue “advertising” SPICE to the international community? (e.g. papers/posters/exhibits/tech interchanges with IAU, EPSC, IPDA, British Interplanetary Society, etc., etc.)? Or not?
 - Should NAIF seek to provide more SPICE training classes abroad? Under what conditions? Or not?
 - What should NAIF do to support the missions named above?
 - Be pro-active?
 - Wait and see if they or HQS does something?